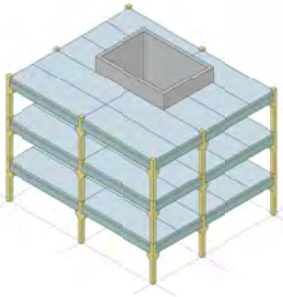
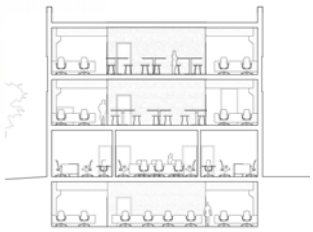
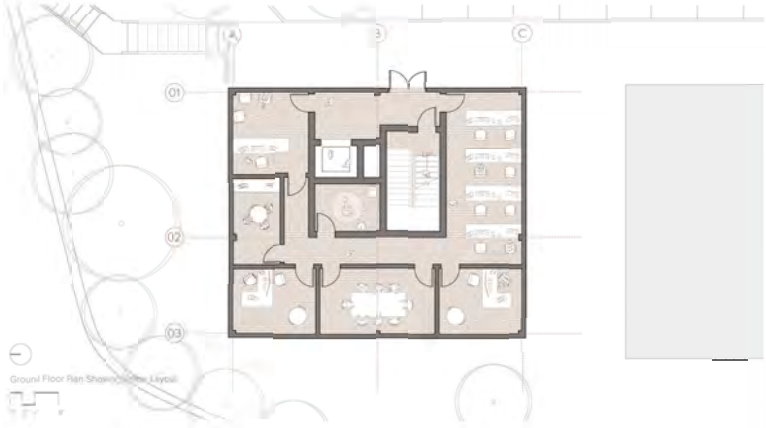
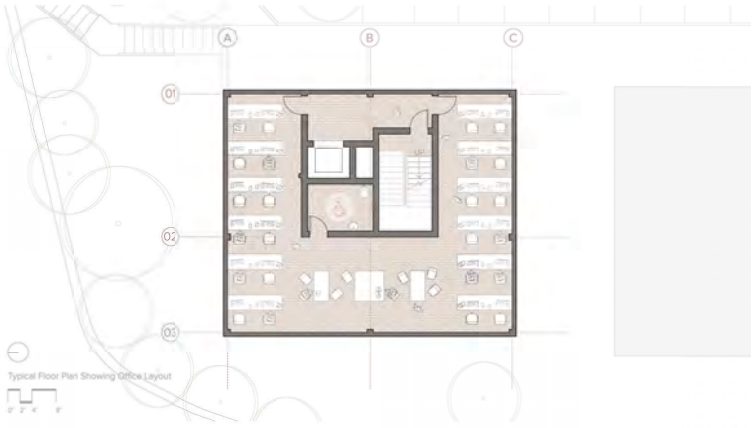
REIMAGINE : Designing Concrete for Disassembly

The goal of the following research is to establish concrete as a suitable building material for designing architecture for disassembly, reuse, and adaptation. Although this technology lends itself to timber construction quite easily, designing concrete structures to utilize this method of assembly has yet to be pursued. Because of this, the ambition to create concrete structures that can be designed for disassembly has arisen. The following proposal is a three story office building that has been designed to be dissembled and reused for purposes other than its initial program. The spatial planning has been strategized in such a fashion that a variety of program uses is quite easily accomplished through the introduction of interior partition walls that divide the interior environment as needed. Furthermore, the modular design and decisions of the project utilize standard construction materials and dimensions in order to accommodate for the ease of deconstruction down the road. Each aspect of the building was carefully designed and constructed in order to create an architecture that lends itself to the users occupying its spaces .Overall, the building will lend itself to become a concrete structure that can be disassembled, reused and adapted throughout its life cycle to become a cyclic architecture that bends to fit the program of its desired purpose.

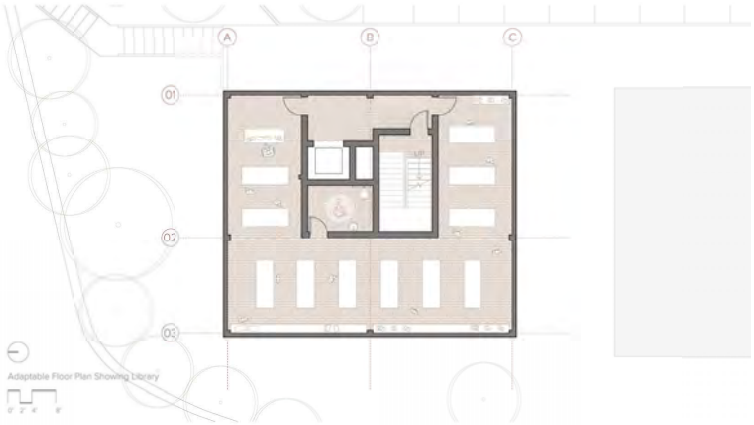








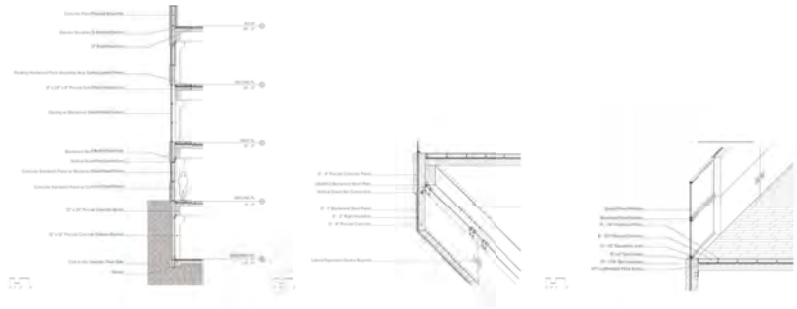
PLAN SET 01, SPATIAL PLANNING



PLAN SET 02, ADAPTABILITY

With a design and methodolcgy for construction and adaptability for the building established, the process of embarking upon disassembly was required. In order to easily facilitate disassembly, an inventory of key materials was created to understand the amount of materials that would be used within the building. However, creating a disassembly inventory allows the proposal to be understood within the context of designing a building for disassembly, reuse and adaptation.

After establishing a disassembly inventory, the final step of the process was to construct a disassembly plan. The method for delivering this drawing was thought of and visualized three dimensionally, and likewise a three dimensional drawing was pursued to best communicate this technology. Within the drawing there are three basic assemblies of the building detailed in their respective method of assembly/disassembly. Furthermore, the diagram also depicts how each separate assembly interacts with the context of the whole. Overall, the building's design was carefully articulated in order to facilitate a building proposal that utilizes concrete in a greater context of designing for disassembly, reuse and adaptation. The ultimate goal of the research is to establish the traditionally linear building component of concrete as one that can now be thought of as cyclic.



Disassembly Inventory

01 Cast-in-situ Floor Slab (Structure)
Roughly 4608 sf

02 Cast-in-situ Walls (Structure)
x8 cast-in-situ concrete walls for building core
x4 foundational walls

03 Precast Concrete Staircase (Structure)
x4

04 Precast Columns (Structure)
x4 + 64 threaded bolt connections

05 Precast Beams (Structure)
x48 + 384 threaded bolt connections
x6 12" x 24" x 24'
x12 12" x 24" x 16'
x6 12" x 24" x 12'
x4 12" x 24" x 8'

06 Solid Fill Floor Slabs (Structure)
x30
x18 8' x 8" x 24'
x12 8' x 8" x 12'

07 Blackened Steel Plates (Finish)
x78 + 468 bolts

08 4' x 8' Sandwich Panels (Finish)
x198
x90 full concrete
x58 concrete & steel
x28 concrete & glazing
x22 steel & glazing

09 Floating Floor Springs (Floor Substructure)
x864 total

10 Batt Insulation (Floor Substructure)
Roughly 4608 sf

11 Wood Framing (Floor Substructure)
x288 2" x 4" x 8' stud
x864 2" x 4" x 1' 5" stud

12 Plywood Sheets (Floor Substructure)
x30
x24 4' x 8' sheets
x6 4' x 4' sheets

13 Hardwood (Floor Substructure & Finish)
Roughly 4608 sf

14 Plumbing Fixtures (Finish)
x4 water closets
x4 lavatories

Diagram Showing Assembly and Disassembly of Elements

0' 4' 8'

01 Exterior Wall Assembly

The exterior wall assembly is erected following the completion of the building frame and floor slab placement within the structure
A primary layer of panels is assembled first at ground level
The secondary layer of panels is then vertically assembled atop the first layer
The tertiary layer of panels is assembled vertically, and is then bolted to the floor assembly via steel angle

02 Structural Assembly

Basement level column is bolted into the cast-in-situ floor slab
Precast columns are stacked vertically, becoming bolted together via a precast thread as the building frame comes together
Precast beams are fit into place and bolted into the columns in conjunction with the construction of the building frame

03 Floor Assembly

The precast floor slab is fit into the building frame by being stacked on top of the precat beam
A series of floating floor springs are fitted atop the floor slab and filled in with batt insulation
A layer of wood framing is placed atop the springs to support the floating floor structure
A layer of plywood is set atop the wood framing
The final layer of hardwood is fit into place to complete the floor assembly